SECTION 02100

SITE PREPARATION

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SECTION 02100

SITE PREPARATION

PART 1 GENERAL

1.1 GENERAL

The contractor shall provide the labor, equipment and materials to clear and grub the site of all brush, trees, stumps, and other materials as specified herein.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 SITE BOUNDARIES

The Contractor will locate all structures and access roads by establishing line and grade in the vicinity of each structure. The contractor shall verify established control points, perform any additional surveys and maintain control points as required to ensure the accuracy of the work.

3.2 GRUBBING

Grubbing shall consist of the removal and disposal of stumps, roots larger than 1-1/2 inches in diameter, matted roots, and subsurface piping, where indicated, from the designated grubbing areas. This material, together with logs and other organic or metallic debris not suitable for foundation purposes shall be excavated and removed to a depth of not less than 18 inches below the final ground elevation in areas indicated to be grubbed and in areas indicated as construction areas for access roads or walkways. Depressions made by grubbing shall be filled with suitable material and compacted such that the finished surface shall match the adjacent surface in composition, degree of compaction, and elevation.

3.3 DISPOSAL OF CLEARED MATERIALS

All brush, and other refuse from the clearing operations shall be removed from site and disposed of at the contractor's expense and at no extra cost to the Government. Disposal of material shall not be permitted on airport property.

END OF SECTION

SECTION 02200

EARTHWORK

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SECTION 02200

EARTHWORK

PART 1 GENERAL

1.1 GENERAL

The contractor shall perform and complete all work as necessary for excavation, filling, backfilling, and grading required on the applicable drawings and specified herein.

1.2 REFERENCES

The latest edition in effect of the following publications form a part of this specification and are applicable to the extent specified herein.

1.2.1 American Association of State Highway and Transportation Officials (AASHTO)

AASHTO-T99Moisture-Density Relations of Soils
AASHTO-T191 Field Determination of Density of Soil in Place, Sand Cone Method
AASHTO-T204 Field Determination of Density of Soil in Place, Dry Cylinder Method
AASHTO-T205 Field Determination of Density of Soil in Place, Rubber Balloon Method
AASHTO-T233 Field Determination of Density of Soil in Place, Block, Chunk or Core

1.2.2 American Society for Testing and Materials (ASTM) Standard

ASTM D-424 Test for Plastic Limit and Plastic Index of Soils

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXCAVATION

3.1.1 Classification

All material excavated is unclassified and can be accomplished by trencher or backhoe and will not require ripping or blasting.

3.1.2 Drainage

Excavation shall be performed so that the area of the site and the area immediately surrounding the site and affecting operations at the site will be continually and effectively drained. Water shall not be permitted to accumulate in the excavation. The excavation shall be drained by pumping or other satisfactory methods to prevent softening of the foundation bottom, undercutting of footings, or other actions detrimental to proper construction procedures.

3.1.3 Freezing

When freezing weather is expected, excavations shall not be made to the full depth, unless the footing concrete can be placed immediately. If excavation is already at full depth, the excavation shall be protected from frost.

3.1.4 Excavation for Slabs and Footings

The excavations shall conform to the dimensions and elevations of the drawings applicable to footings and other foundation structures which are cast in place.

3.1.4.1 Limits

Excavations below indicated depths shall not be permitted except to remove material consisting of shale, sod, clods, stones larger than 4 inches, organic debris, trash or frozen material. Such unsatisfactory material shall be removed to a depth of 6 inches and replaced with satisfactory fill material. Unauthorized over excavation for footings shall be replaced at no additional cost to the Government to the indicated excavation grade with concrete. Excavation shall extend a sufficient distance from footings to allow for placing and removal of forms, installation of services, and for inspection, except where the concrete for walls and footings is authorized by the Resident Engineer to be deposited directly against excavated rock surfaces.

3.1.5 Trench Excavation

Trenches for direct earth burial cables, conduits and other utilities shall conform to the dimensions and elevations shown on the applicable drawings. The banks need not be kept vertical but may be sloped or widened to such general limits as may be set by the Resident Engineer, provided there is no interference with other utilities. The trench bottom shall be a minimum of 6 inches wide or as required to provide separation between power and control cables or between power cables of different voltages. The trench depth shall be deep enough to allow cable placement plus an over excavation of at least three inches. The over excavation shall be filled with earth or sand containing no material aggregate particles that would be retained on a 1/4-inch sieve. The fill material shall be compacted to approximately the same density of the adjacent soil.

3.1.6 Excavation for Walkways and Access Roads

The excavation shall conform to the dimensions and elevations of the drawings applicable to areas designed for vehicular and pedestrian traffic. Subgrade areas for access roads and walkways shall be plowed, disked and moistened or aerated as required obtain proper compaction. Muck, peat and other unsatisfactory material shall be removed to a minimum depth of 12 inches below excavation grade or as required to provide a satisfactory foundation. Low areas resulting from removal of such material shall be brought up to required grade with satisfactory fill material.

3.1.7 Excavation of Ditches, Swales and Culverts

Ditches, swales and culverts shall be cut accurately to the cross sections and grades indicated. The sides and bottom of ditches and swales shall conform to the slope, grade, and shape of the section indicated. Care shall be taken not to excavate ditches and swales below the grades indicated. Excessive excavation shall be backfilled to the indicated excavation depth with approved material and compacted to 90 percent maximum density. All ditches, swales, and culverts excavated under this section shall be maintained until final acceptance of the work.

3.1.8 Safety and Protection of Work

Sheeting and shoring shall be done as may be necessary for the protection of the work and for the safety of personnel. The manner of bracing excavations shall comply with local regulations and OSHA construction regulations. Grading shall be performed in a manner to ensure proper drainage at all times.

3.1.9 Utilization of Excavated Materials

Satisfactory excavated material shall be used in the work insofar as practicable. No excavated material shall be disposed of in such a manner as to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

3.1.10 Inspection of Excavated Area

When excavations have reached the required elevations, the contractor shall not proceed with further construction of the excavated area until the area has been inspected by the Resident Engineer.

3.2 FILL AND BACKFILL

3.2.1 Weather Conditions

No fill or backfill operations shall be performed when weather conditions are determined by the Resident Engineer to be too wet or cold to permit such operations.

3.2.2 Satisfactory Material

Material suitable for fill, backfill and embankment purposes shall be reasonably free of shale, sod, clods, and stones larger than 4 inches, organic debris, trash and frozen material. Only materials suitable for obtaining the degree of compaction specified herein shall be used.

3.2.3 Preparation of Surface for Fill and Embankment

All surfaces designated to receive fill and embankment material shall be inspected prior to material placement. Soil surfaces on which compacted fill is to be placed shall be plowed, disked or otherwise broken up to a depth of 6 inches, pulverized, moistened or aerated as necessary, mixed and compacted to the same density as required for the fill or embankment material. Sloped ground surfaces steeper than one vertical to four horizontal on which fill is to be placed shall be stepped or benched, as directed, in such manner that the fill material will bond with the existing surface. The finished surface shall be reasonable smooth, compacted and free from irregular surface changes. The degree of finish shall be that ordinarily obtained from blade-grader operations or, where more suitable, hand raking.

3.2.4 Source of Fill Material

Fill material shall be selected for the particular fill area for which it is to be used. Fill material shall not be confused with surfacing aggregate. Necessary clearing, grubbing, and disposal of debris, shall be considered incidental operations to the borrow excavation and shall be performed by the contractor. All material stockpiled on site shall either be used as fill material or disposed of by the contractor.

3.2.5 Fill for Slabs and Foundations

Satisfactory material shall be placed in horizontal layers of 6 inches (loose measurement) and compacted to 95 percent maximum density. Unless directed by the Resident Engineer, no backfill shall be placed against footings prior to 7 days after footings and slabs are poured.

3.2.6 Backfilling of Conduit Trenches

Trenches shall be backfilled as indicated on the drawings. Unless otherwise indicated, backfilling of the conduit trenches shall be done as follows:

- Place 4 inches of sand in the base of the trench.
- Place clean conduits on top of the sand base. Use conduit spacers (or other approved method) to maintain the required horizontal and vertical separation between conduits.
- Place sand to a level of 12 inches above the top of the conduits.
- TAMP sand.
- Place guard wire and warning tape.
- Place approximately 14" of select fill above sand (select fill shall contain no particles that would be retained on a 1 inch sieve).
- TAMP and COMPACT select fill to a minimum of 90% of maximum density in accordance with AASHTO-T-99. Compacted depth should be approximately 12" above sand.
- Place approximate 14" more of select fill.
- TAMP and COMPACT again to a minimum of 90% of maximum density.
- Place the remaining amount of select fill required and COMPACT and TAMP a third time. The finished level of the top of the trench shall not exceed 2 inches above the surrounding grade.

The disturbed area shall be cleaned, raked, and seeded. All trench backfilling shall be to the approval of the Airport Manager and the Project Engineer. THE CONTRACTOR SHALL GUARANTEE THAT NO SETTLEMENT OCCURS WHICH LEAVES A DEPRESSION BELOW THE SURROUNDING GRADE FOR A PERIOD OF ONE YEAR AFTER PROJECT COMPLETION.

3.2.7 Fill and Embankment for Access Roads, Walkways, and Culverts

Fills and embankments shall be constructed at the locations and to lines and grades indicated on the drawings. The material shall be placed in successive horizontal layers of 8 inches, loose measure, for the full width of the cross section. Fills and embankments shall be compacted to 95 percent of maximum density. Final elevations after compaction shall not vary more than 0.05 feet from the established grade and approved cross section.

3.2.8 Fill for Open Areas

All open areas to receive seed or sod shall be filled to within 6 inches of final grade with satisfactory material. Fill beneath this layer shall consist of material free of rocks larger than 6 inches and shall be placed in layers not greater than 8 inches, loose measure. All layers shall be compacted to 90 percent maximum density.

3.2.9 Placing of Crushed Rock and Topsoil

On areas to receive crushed rock or topsoil material, the compacted fill or subgrade shall be scarified to a depth of 2 inches. Material to be placed shall then be evenly spread, graded and compacted to 90 percent of maximum density. Material required to be placed within two feet of footings or slabs shall be compacted by approved hand tampers. Compaction of topsoil to be grassed or sodded may be deferred until after seeding or sodding operations.

3.2.10 Compaction Methods

Compaction shall be performed using the method and equipment suitable for the area as specified. Mechanical hand tampers shall be used only in areas adjacent to footings and slabs or in trenches or other areas where use of rollers is not practical. Compaction with pneumatic-tired rollers, three wheel power rollers, sheepsfoot rollers, etc., shall be used in all other areas as required to provide the specified compaction density.

3.2.11 Determination of Density

Maximum density tests will be performed in accordance with AASHTO-T99 and field density tests will be performed in accordance with AASHTO-T191, T204, T205, or T233.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

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SECTION 03100

CONCRETE FORMWORK

PART 1 GENERAL

1.1 GENERAL

The contractor shall provide all labor, equipment and materials as required to locate and place concrete forms specified herein or on applicable drawings.

PART 2 PRODUCTS

2.1 FORMS

Forms shall be wood, plywood, metal or other approved material. The contractor may use prefabricated forms for cylindrical foundations if indicated on the applicable drawings. All form materials shall be of the grade or type suitable to obtain the kind of finish specified.

2.2 CYLINDRICAL CONCRETE PIERS

All cylindrical concrete piers, if required, shall be formed to a depth of two feet minimum. Use approved cylindrical forms.

2.3 FORM TIES

Form ties shall be either fixed band type or threaded internal disconnecting type with a working load suitable to prevent deformation of forms. They shall be of the type as to leave no metal closer to the surface than 1/2 inches for steel ties and 1 inch for stainless steel ties. Twisted wire ties shall not be permitted.

2.4 FORM OIL

Form oil shall be nonstaining and shall not cause softening of the concrete or impede the wetting of surfaces to be cured with water or curing compounds.

PART 3 EXECUTION

3.1 FORMWORK PLACEMENT

Formwork shall not be placed prior to inspection, testing or approval of the excavated area and imbedded items by the Resident Engineer. Forms shall result in a final structure which does not

exceed +1/2 inch variation in any dimension shown on the applicable drawings. Form joints shall be sufficiently tight to prevent leakage of mortar. Form oils shall be placed on forms or form ties and shall be removed from reinforcing steel or conduits if accidentally applied to such.

3.2 FORM CURING

In hot, dry climates, wood forms remaining in place shall not be considered adequate curing, but shall be loosened so that the concrete surfaces may be cured in accordance with 3-3.6.

3.3 FORM REMOVAL

Forms shall not be removed until concrete has attained at least 30 percent of the specified 28-day compressive strength.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

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SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 GENERAL

The contractor shall provide the necessary labor, materials and equipment for the placement of steel reinforcement as specified herein and shown on the applicable drawings.

1.2 REFERENCES

The following specifications and standards of the issues currently in force, form a part of this section and are applicable as specified herein.

1.2.1 American Society for Testing and Materials (ASTM)

ASTM A 615 - Deformed Billets Steel Bars for Conc. Reinforcement

ASTM A 185 - Welded Wire Fabric for Concrete Reinforcement

1.2.2 American Concrete Institute (ACI) Standards

ACI 315 - Manual of Engineering and Placing Drawings for Reinforced Concrete Structures

PART 2 PRODUCTS

2.1 REINFORCING STEEL

Reinforcing steel shall be new, clean, undamaged, and unless otherwise indicated, conforming to ASTM A-615, grade 60.

2.2 TIE WIRE, CHAIRS, AND SPACERS

All devices necessary to properly space, support and fasten steel reinforcement in place during concrete placement shall conform to ACI 315. Tie wire shall be 16 gauge or larger annealed iron wire.

PART 3 EXECUTION

3.1 REINFORCEMENT SURFACES

Steel reinforcement shall be free of mud, oil or other nonmetallic coatings which may affect bonding quality. Mill scale or rust remaining after hand brushing with a wire brush is permissible.

3.2 BENDING

All bends in bars and ties shall be cold bent. No bends shall be made in bars or ties partially embedded in concrete.

3.3 HOOKS

Hooks indicated shall be 180 degree hooks. The bend diameter as measured on the inside of the bar shall be not less than 6 bar diameters for bars and not less than 1-1/2 inches for #3 ties.

3.4 PLACING REINFORCEMENT

Steel reinforcement shall be accurately placed at the spacing and in the sizes indicated on the applicable drawings and secured against displacement during the pour operations. Reinforcement shall be placed within +l/2 inch of the indicated dimensions.

3.5 QUALITY ASSURANCE

Two copies of mill certificates of steel compliance with ASTM A 615 shall be submitted to the Resident Engineer at the time of site delivery. The certificate shall be signed by an authorized officer of the contractor, and shall include the project name and location, and the quantity and delivery date to which the certificate applies.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 GENERAL

The contractor shall provide the necessary materials, labor and equipment for the placement of concrete as specified herein and shown on applicable drawings.

1.2 REFERENCES

The following specifications and standards of the issues currently in force, form a part of this section and are applicable as specified herein.

1.2.1 American Society for Testing and Materials (ASTM) Specifications

ASTM C 33 Specifications for Concrete Aggregates
ASTM C 94 Specifications for Ready-Mixed Concrete
ASTM C 143 Slump of Portland Cement Concrete
ASTM C 150 Specification for Portland Cement
ASTM C 231 Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260 Specification for Air-Entraining Admixtures for Concrete
ASTM C 494 Specification for Chemical Admixtures for Concrete

1.2.2 American Concrete Institute (ACI) Specification

ACI 211.1 - Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete

1.3 SUBMITTALS

Provide certification signed by material producer and contractor that all materials and mix compositions comply with the specified requirements.

PART 2 PRODUCTS

2.1 CEMENT

All cement shall conform to ASTM C 150, Type I or Type III as indicated on the drawings.

2.2 AGGREGATES

Aggregate shall conform to ASTM C 33 except that maximum aggregate size shall be 3/4-inch.

2.3 WATER

Water used in mixing and curing operations shall be clean, and free from oils, acids, organic matter and chemical suspensions which may adversely affect cure times, strength requirements or service life of the concrete.

2.4 ADMIXTURES

Air entraining admixtures shall conform to ASTM C 260. Admixtures used for water-reducing and retarding shall conform to ASTM C 494, Type A or Type D.

2.5 QUALITY

2.5.1 Slump

The concrete shall have a slump of 3 to 4 inches.

2.5.2 Strength

Unless otherwise indicated on the construction drawings, Type I concrete shall have a 28 day compressive strength of 3,000 psi and Type III shall have a 7 day compressive strength of 3,000 psi.

2.5.3 Air Content

Air entraining for all concrete shall be 4 to 8 percent.

2.5.4 Proportions

Concrete materials shall be proportioned in accordance with ACI 211.1 for site mixed concrete and ASTM C 94 for ready mixed concrete.

PART 3 EXECUTION

3.1 MIXING AND PLACING CONCRETE

3.1.1 Site Preparation

Prior to placing concrete all areas to receive concrete shall be inspected and approved by the Resident Engineer. Concrete shall not be deposited on muddy or frozen material. All surfaces to be in contact with the concrete shall be wetted.

3.1.2 Mixing

All mixers used for ready mix or site mix operations shall be cleaned prior to material recharge. The area of operation of the mixers shall be such as to not endanger existing structures or excavations. All concrete shall be mixed until there is a uniform distribution of materials. Concrete having attained initial set or having contained water for more than 90 minutes shall not be used in the work.

3.1.3 Conveying

Concrete shall be conveyed from the mixer to the deposit site by equipment which will prevent separation or loss of material and which will ensure a nearly continuous flow of material at the deposit site.

3.1.4 Depositing

Concrete shall be placed in such a manner as to prevent displacement of forms or reinforcement. Placing shall be stopped if contamination due to sloughing occurs until the contaminant can be removed. In the case of form or reinforcement displacement, placing may be continued only if the displacement is corrected within specified tolerances. The placing of concrete shall be a continuous operation at each deposit site and shall be completed within 1-1/2 hours after the addition of water. Concrete shall be deposited in 12 to 18 inch layers as level as possible prior to consolidation operations. Under no circumstances shall fresh concrete be placed over concrete that is no longer plastic. Time between placements at each deposit site shall not exceed one hour for regular mixes and two hours for retarded mixes.

3.1.5 Cylindrical Concrete Piers

Tops of piers shall be furnished flat within the confines of the Sonotube forms. Unless otherwise approved, the edges shall have a 1/2" or 3/4" radius. No spillage (mushrooming) over the tops of forms will be allowed.

3.1.6 Consolidation

Consolidation of concrete during and after placing shall be performed using an internal vibrator with a vibration frequency not less than 150 hertz. Each layer shall be consolidated so that concrete is thoroughly worked around reinforcement, embedded items and forms. Vibrators shall penetrate about 6 inches into underlying layers to ensure proper union of the layers. Movement of the vibrator over the layer shall be such as to ensure uniform plasticity without pooling of cement.

3.1.7 Finish

After the concrete has been placed and consolidated, the surface shall be screed with straight edges, floated, and troweled to the required finish level. All concrete surfaces shall have a smooth finish except for exposed top surfaces which shall have a broom finish. Broom lines shall be straight and parallel to the form edges and well defined. Unless otherwise indicated on the drawings, the foundation surface shall be level +/- 1/8" and all exposed edges shall be chamfered 1 inch (1/2" or 3/4" radius on circular tops). A NEAT, CLEAN, PROFESSIONAL CONCRETE FINISH IS REQUIRED! Concrete not meeting this requirement shall be completely removed and replaced at the contractor's expense.

Apply a Concrete Curing Compound (SealMaster or as approved) as directed by the manufacturer and as approved. Concrete Curing Compound should generally be applied once the concrete is firm enough to walk on with no surface water present (about one hour after final trowelling or when application will not mar surface).

3.2 CURING

Concrete shall be maintained above 50 degrees F and less than 120 degrees F and in a moist condition during the cure period. The cure period shall be 7 days when Type I Portland cement is used and 3 days when Type III Portland cement is used. Exposed surfaces shall be covered with burlap, cotton, or other approved fabric or sand. If air temperatures are expected to exceed 75 degrees F, water curing shall be continuous and forms shall be loosened as soon as the concrete has set sufficiently to prevent damage. In conditions where air temperature may be expected to fall below 40 degrees F, equipment and covering to maintain a 50 degree concrete temperature shall be provided. Salt or other chemicals to prevent freezing shall not be permitted.

3.3 ANCHOR BOLTS, PLATES, AND COUPLINGS

3.3.1 Anchor Bolts and Plates

Anchor bolts shall be installed in concrete prior to the concrete setting and at a time and manner to assure that there is no voids around the bolts. Anchor bolts and plates shall be set level and plumb, and within a tolerance necessary for their proper alignment and to the structure support. Flanges and anchors shall be set level and plumb, and within a tolerance necessary for their proper alignment and to the frangible structure they support. All bolts and other hardware shall be hot-dipped galvanized and shall be contractor furnished (unless otherwise indicated to be government furnished).

3.3.2 Embedded Couplings

Couplings embedded in concrete shall be installed so that the top of the coupling is flush with the top of concrete and conduits to be extended from the coupling are level and plumb. Foundations with embedded couplings that do not meet this requirement shall be removed and re-installed at the contractors expense.

3.4 QUALITY ASSURANCE

3.4.1 Testing

Testing for the concrete shall be arranged by the contractor and performed by an independent testing company (in the presence of the Resident Engineer) at the expense of the contractor. If these tests show concrete strength less than specified, the contractor shall correct the situation and be responsible for all associated cost.

3.4.2 Certification

The contractor shall furnish a certificate that all materials, compositions, densities and mixtures to be used meet local or state requirements. The contractor shall provide the Resident Engineer with a delivery ticket (batch ticket) for ready mix concrete from the concrete supplier at the time of each delivery which certifies compliance with material and quality requirements specified herein. The tickets shall indicate the delivery date, time dispatched, name and location of project, name of contractor, name of concrete producer, truck number, quantity, air content, admixtures and design strength of the concrete delivered.

3.5 REPAIR OR REPLACEMENT

The contractor shall restore concrete damaged by work under this contract to its original condition as directed by the Resident Engineer. The Resident Engineer shall reject any fresh concrete not meeting slump or air entrainment requirements. Any concrete not meeting strength requirements shall be removed and replaced by the contractor. Any repair or replacement costs shall be paid by the contractor.

END OF SECTION